

TEST REPORT

Product Name: FA x GPS Tracker
FCC ID: 2BCG8-CSIFAX
Trademark: AIBEILE
Model Number: CSI FA x
Prepared For: BE SOLUTIONS S.A.S.
Address: KR 54 # 1 A - 51 OF 506, Cali - Valle, Colombia
Manufacturer: Shenzhen Huaten Global Co.,Ltd
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Prepared By: Shenzhen CTB Testing Technology Co., Ltd.
Address: 1&2/F., Building A, No.26, Xinghe Road, Xinqiao, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, China
Sample Received Date: Jul. 03, 2022
Sample tested Date: Jul. 03, 2022 to Jul. 28, 2022
Issue Date: Jul. 28, 2022
Report No.: CTB230728029RFX
Test Standards: FCC Part 22H & 24E
Test Results: PASS
Remark: This is GSM radio test report.

Compiled by:

Reviewed by:

Approved by:

Zhou Kui

Arron Liu

Zhou KuiArron LiuBin Mei / Director

Note: If there is any objection to the inspection results in this report, please submit a written report to the company within 15 days from the date of receiving the report. The test report is effective only with both signature and specialized stamp. This result(s) shown in this report refer only to the sample(s) tested. Without written approval of Shenzhen CTB Testing Technology Co., Ltd. this report can't be reproduced except in full. The tested sample(s) and the sample information are provided by the client. "*" indicates the testing items were fulfilled by subcontracted lab. "#" indicates the items are not in CNAS accreditation scope.

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(Note: N/A means not applicable)



1. VERSION

Report No.	Issue Date	Description	Approved
CTB230728029RFX	Jul. 28, 2022	Original	Valid

2. TEST SUMMARY

The Product has been tested according to the following specifications:

FCC Rules	Description of Test Item	Result
§1.1307, §2.1091	RF Exposure	Compliant
§22.913 (a), §24.232 (c)	RF Output Power	Compliant
§24.51	Peak-to-average Ratio(PAR) of Transmitter	Compliant
§22.917 (b), §24.238 (b)	Emission Bandwidth	Compliant
§22.917 (a), §24.238 (a)	Spurious Emissions at Antenna Terminal	Compliant
§22.917 (a), §24.238 (a)	Spurious Radiation Emissions	Compliant
§22.917 (a), §24.238 (a)	Out of Band Emissions	Compliant
§22.355, §24.235	Frequency Stability	Compliant

3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Item	Uncertainty
Occupancy bandwidth	54.3kHz
Conducted output power Above 1G	0.9dB
Conducted output power below 1G	0.9dB
Power Spectral Density , Conduction	0.9dB
Conduction spurious emissions	2.0dB
Out of band emission	2.0dB
3m camber Radiated spurious emission(30MHz-1GHz)	4.6dB
3m chamber Radiated spurious emission(1GHz-18GHz)	5.1dB
3m chamber Radiated spurious emission(18GHz-40GHz)	3.4dB
Receiver Reference Sensitivity level	1.9dB
humidity uncertainty	5.5%
Temperature uncertainty	0.63°C
frequency	1×10 ⁻⁷

4. PRODUCT INFORMATION AND TEST SETUP

4.1 Product Information

Model(s):	CSI FA x
Model Description:	N/A
Hardware Version:	C401_MB_V1.1
Software Version:	V1.0
Operation Frequency:	GPRS/EDGE 850: 824~849MHz GPRS/EDGE 1900: 1850~1910MHz
Max. RF output power:	GSM850: 32.37dBm, GSM1900: 28.16dBm
Type of Modulation:	GMSK, BPSK
Antenna installation:	Internal antenna
Antenna Gain:	GSM850: -9.09dBi, GSM1900: -6.75dBi
Ratings:	DC 5V charging from adapter DC 3.8V from battery

4.2 Test Setup Configuration

See test photographs attached in EUT TEST SETUP PHOTOGRAPHS for the actual connections between Product and support equipment.

4.3 Support Equipment

No.	Device Type	Brand	Model	Series No.	Note
1.	Adapter	JIYIN	JY-05100C	/	/

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

4.4 Channel List

Testing Configure			
Support Band	Support Standard	Channel Frequency	Channel Number
GSM 850	GPRS/EDGE	824.2 MHz	128
		836.6 MHz	190
		848.8 MHz	251
PCS 1900	GPRS/EDGE	1850.2 MHz	512
		1880.0 MHz	661
		1909.8 MHz	810
Note: the transmitter has been tested on the communications mode of GSM, GPRS, EDGE compliance test and record the worst case.			

4.5 Test Mode

Test Mode List		
Test Mode	Description	Remark
TM1	GPRS 850	Low, Middle, High Channels
TM2	EDGE 850	Low, Middle, High Channels
TM3	GPRS 1900	Low, Middle, High Channels
TM4	EDGE 1900	Low, Middle, High Channels

4.6 Test Environment

Humidity(%):	54
Atmospheric Pressure(kPa):	101
Normal Voltage(DC):	3.8V
Normal Temperature(°C)	23
Low Temperature(°C)	0
High Temperature(°C)	40

5. TEST FACILITY AND TEST INSTRUMENT USED

5.1 Test Facility

All measurement facilities used to collect the measurement data are located at 1&2F., Building A, No. 26, Xinghe Road, Xinqiao, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.

5.2 Test Instrument Used

Item	Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	Agilent	N9020A	MY52090073	2024.07.05
2	Power Sensor	Agilent	U2021XA	MY56120032	2024.07.05
3	Power Sensor	Agilent	U2021XA	MY56120034	2024.07.05
4	Communication test set	R&S	CMW500	108058	2024.07.05
5	Spectrum Analyzer	KEYSIGHT	N9020A	MY51289897	2024.07.05
6	Signal Generator	Agilent	N5181A	MY50140365	2024.07.05
7	Vector signal generator	Agilent	N5182A	MY47420195	2024.07.05
8	Communication test set	Agilent	E5515C	MY50102567	2024.07.06
9	2.4 GHz Filter	Shenxiang	MSF2400-2483.5MS-1154	20181015001	2024.07.05
10	5 GHz Filter	Shenxiang	MSF5150-5850 MS-1155	20181015001	2024.07.06
11	Filter	Xingbo	XBLBQ-DZA120	190821-1-1	2024.07.06
12	BT&WI-FI Automatic test software	Microwave	MTS8000	Ver. 2.0.0.0	/
13	Rohde & Schwarz SFU Broadcast Test System	R&S	SFU	101017	2023.10.30
14	Temperature humidity chamber	Hongjing	TH-80CH	DG-15174	2024.07.05
15	234G Automatic test software	Microwave	MTS8200	Ver. 2.0.0.0	/
16	966 chamber	C.R.T.	966	/	2024.08.11
17	Receiver	R&S	ESPI	100362	2024.07.05
18	Amplifier	HP	8447E	2945A02747	2024.07.05
19	Amplifier	Agilent	8449B	3008A01838	2024.07.05
20	TRILOG Broadband Antenna	Schwarzbeck	VULB 9168	00869	2024.07.08

21	Double Ridged Broadband Horn Antenna	Schwarzbeck	BBHA9120D	01911	2024.07.08
22	EMI test software	Fala	EZ-EMC	FA-03A2 RE	/
23	Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-224	2024.07.08
24	loop antenna	ZHINAN	ZN30900A	GTS534	/
25	40G Horn antenna	A/H/System	SAS-574	588	2023.10.30
26	Amplifier	AEROFLEX	Aeroflex	097	2023.10.30

6. RF OUTPUT POWER

6.1 Standard Applicable

According to §22.913(a)(2), The ERP of mobile and portable stations transmitters and auxiliary test transmitters must not exceed 7 Watts.

According to §24.232 (c), Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

6.2 Test Procedure

Conducted output power test method:



Radiated power test method:

- 1.The setup of EUT is according with per ANSI/TIA Standard 603D and ANSI C63.4-2014 measurement procedure.
- 2.The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.
- 3.The frequency range up to tenth harmonic of the fundamental frequency was investigated.
- 4.Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

6.3 Environmental Conditions

Temperature:	23 °C
Relative Humidity:	54%
ATM Pressure:	1010 mbar

6.4 Summary of Test Results/Plots

Max. Radiated Power

ERP For GPRS Mode GSM850

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 22H Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	dBm	dBm
Low Channel								
824.2	31.58	1.5	0	H	1.5	0.5	28.58	38.45
824.2	32.02	1.5	0	V	1.5	0.5	29.02	38.45
Middle Channel								
836.6	31.82	1.5	0	H	1.5	0.5	28.82	38.45
836.6	31.07	1.5	0	V	1.5	0.5	28.07	38.45
High Channel								
848.8	31.30	1.5	0	H	1.5	0.5	28.30	38.45
848.8	31.60	1.5	0	V	1.5	0.5	28.60	38.45

EIRP For GPRS Mode PCS1900

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 24E Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	dBm	dBm
Low Channel								
1850.2	27.89	1.5	0	H	1.9	2	24.49	33.00
1850.2	27.81	1.5	0	V	1.9	2	24.41	33.00
Middle Channel								
1880	27.25	1.5	0	H	1.9	2	23.85	33.00
1880	27.15	1.5	0	V	1.9	2	23.75	33.00
High Channel								
1909.8	27.80	1.5	0	H	1.9	2	24.40	33.00
1909.8	27.39	1.5	0	V	1.9	2	23.99	33.00

ERP For EDGE Mode GSM850

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 22H Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	dBm	dBm
Low Channel								
824.2	31.99	1.5	0	H	1.5	0.5	28.99	38.45
824.2	31.45	1.5	0	V	1.5	0.5	28.45	38.45
Middle Channel								
836.6	31.31	1.5	0	H	1.5	0.5	28.31	38.45
836.6	31.35	1.5	0	V	1.5	0.5	28.35	38.45
High Channel								
848.8	32.22	1.5	0	H	1.5	0.5	29.22	38.45
848.8	32.31	1.5	0	V	1.5	0.5	29.31	38.45

EIRP For EDGE Mode PCS1900

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 24E Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	dBm	dBm
Low Channel								
1850.2	27.73	1.5	0	H	1.9	2	24.33	33.00
1850.2	28.12	1.5	0	V	1.9	2	24.72	33.00
Middle Channel								
1880	28.06	1.5	0	H	1.9	2	24.66	33.00
1880	27.95	1.5	0	V	1.9	2	24.55	33.00
High Channel								
1909.8	27.20	1.5	0	H	1.9	2	23.80	33.00
1909.8	27.02	1.5	0	V	1.9	2	23.62	33.00

Max. Conducted Output Power

For Cellular Band (GSM850)

Test Mode	Channel	Frequency (MHz)	Average Power (dBm)	FCC Part 22.913 Limit (dBm)
GPRS(1 Slot)	Low Channel	824.2	32.14	38.45
	Middle Channel	836.6	32.05	38.45
	High Channel	848.8	32.10	38.45
EDGE(1 Slot)	Low Channel	824.2	32.13	38.45
	Middle Channel	836.6	32.02	38.45
	High Channel	848.8	32.37	38.45

For PCS Band (GSM1900)

Test Mode	Channel	Frequency (MHz)	Average Power (dBm)	FCC Part 24.232 Limit (dBm)
GPRS(1 Slot)	Low Channel	1850.2	28.13	33.0
	Middle Channel	1880.0	28.05	33.0
	High Channel	1909.8	27.84	33.0
EDGE(1 Slot)	Low Channel	1850.2	28.16	33.0
	Middle Channel	1880.0	28.09	33.0
	High Channel	1909.8	27.85	33.0

7. PEAK-TO-AVERAGE RATIO(PAR) OF TRANSMITTER

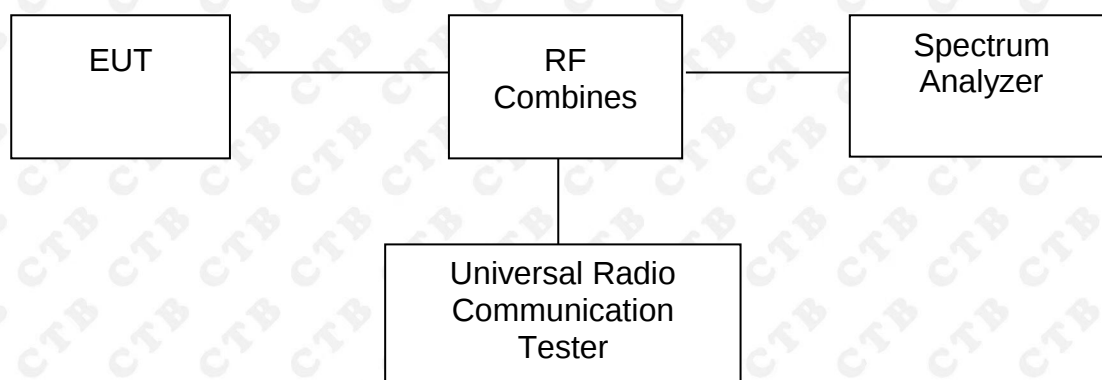
7.1 Standard Applicable

According to §24.232(d), Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

7.2 Test Procedure

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 30kHz and the peak-to-average ratio (PAR) of the transmission was recorded. Record the maximum PAPR level associated with a probability of 0.1%.

Test Configuration for the emission bandwidth testing:



7.3 Environmental Conditions

Temperature:	23 °C
Relative Humidity:	54%
ATM Pressure:	1010 mbar

7.4 Summary of Test Results

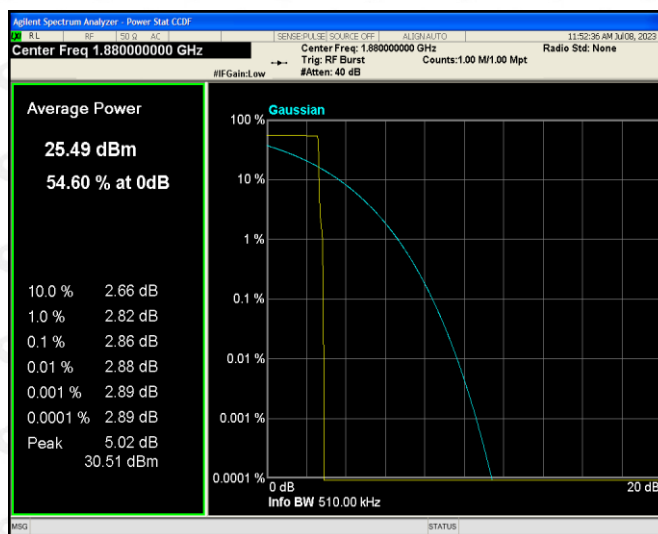
Only the worst case was selected to record
For GSM850

Test Mode	Channel	Frequency (MHz)	PAR (dB)	Limit (dB)
GPRS(1 Slot)	190	836.6	2.74	13
EDGE(1 Slot)	190	836.6	2.74	13

For PCS 1900

Test Mode	Channel	Frequency (MHz)	PAR (dB)	Limit (dB)
GPRS(1 Slot)	512	1850.2	2.86	13
EDGE(1 Slot)	512	1850.2	2.86	13

GSM :



8. EMISSION BANDWIDTH

8.1 Standard Applicable

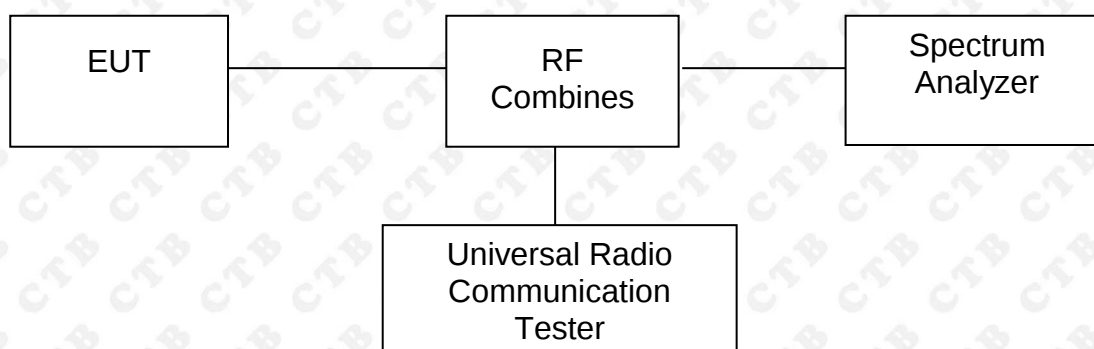
According to §22.917(b), The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

According to §24.238(b), The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

8.2 Test Procedure

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 10kHz for GSM mode and 100kHz for WCDMA mode, VBW shall be at least 3 times the RBW, and the 26dB bandwidth was recorded.

Test Configuration for the emission bandwidth testing:



8.3 Environmental Conditions

Temperature:	23 °C
Relative Humidity:	54%
ATM Pressure:	1010 mbar

8.4 Summary of Test Results/Plots

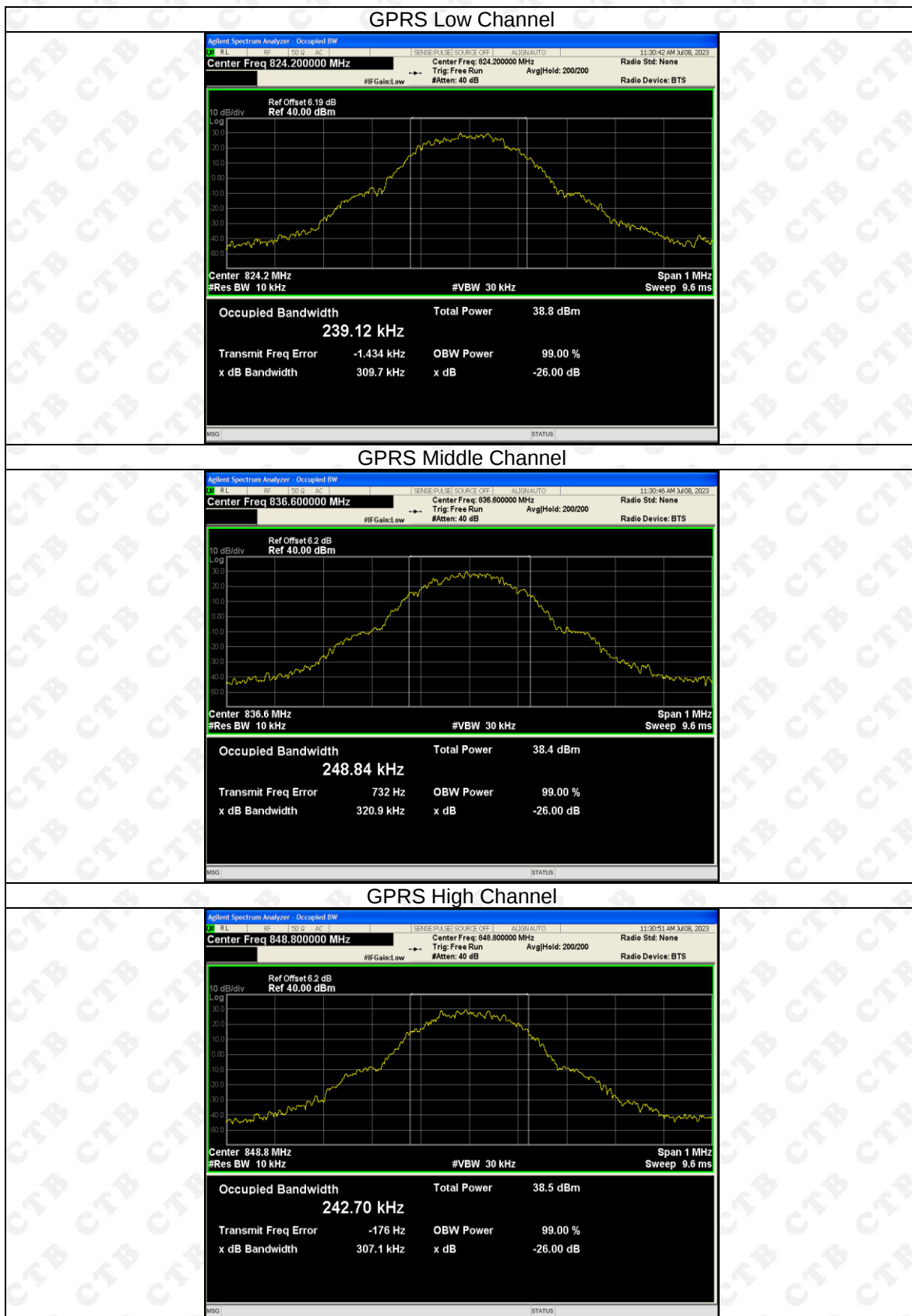
For Cellular Band

Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GPRS	128	824.2	239.119	309.749
	190	836.6	248.842	320.864
	251	848.8	242.703	307.087
EDGE	128	824.2	244.451	311.605
	190	836.6	242.099	311.450
	251	848.8	245.382	309.405

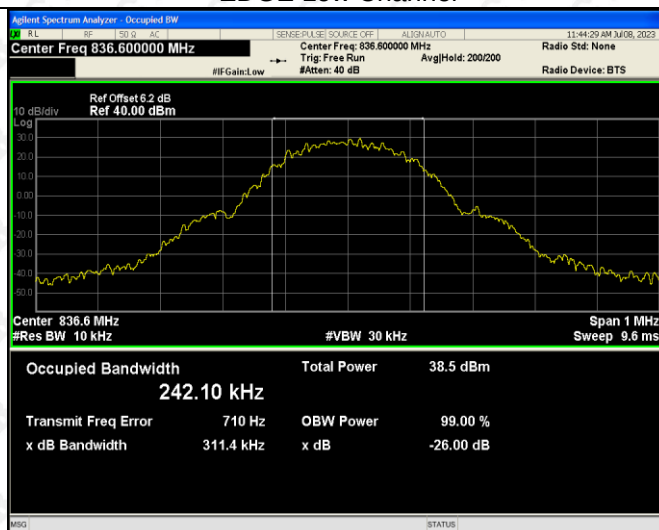
For PCS Band

Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GPRS	512	1850.2	235.885	304.058
	661	1880.0	237.292	304.979
	810	1909.8	241.713	309.843
EDGE	512	1850.2	235.723	299.698
	661	1880.0	232.775	300.455
	810	1909.8	238.061	300.144

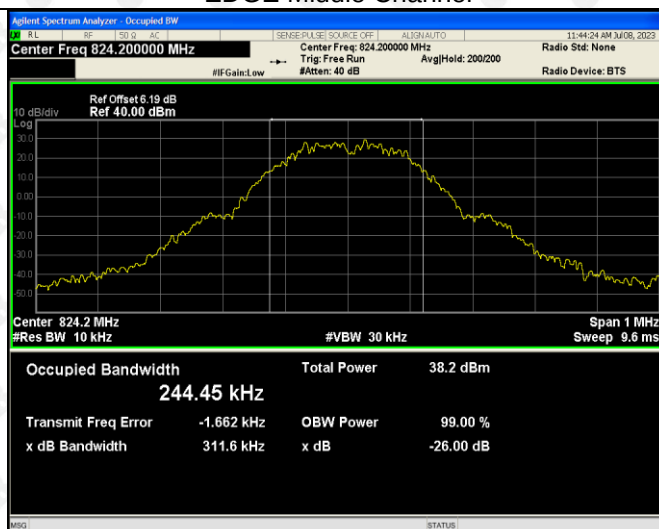
For Cellular Band



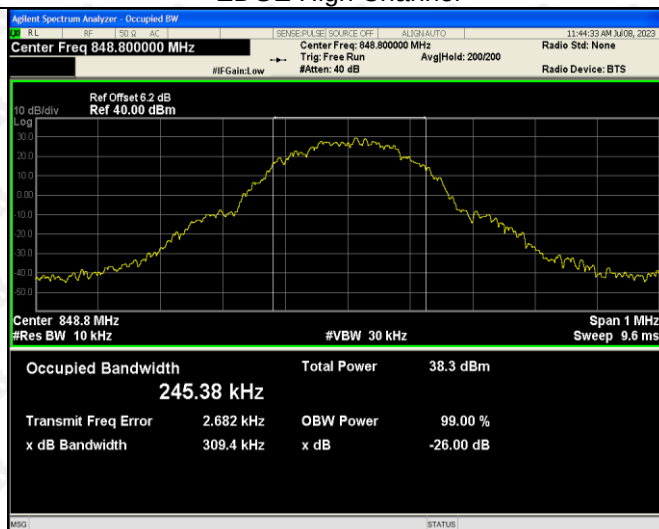
EDGE Low Channel



EDGE Middle Channel

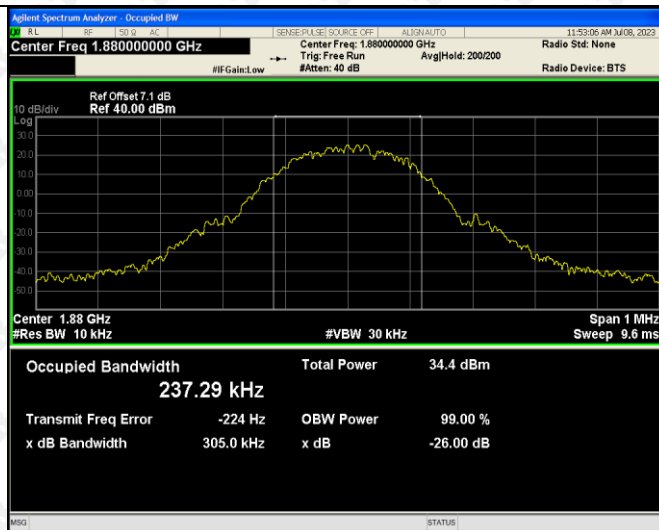


EDGE High Channel

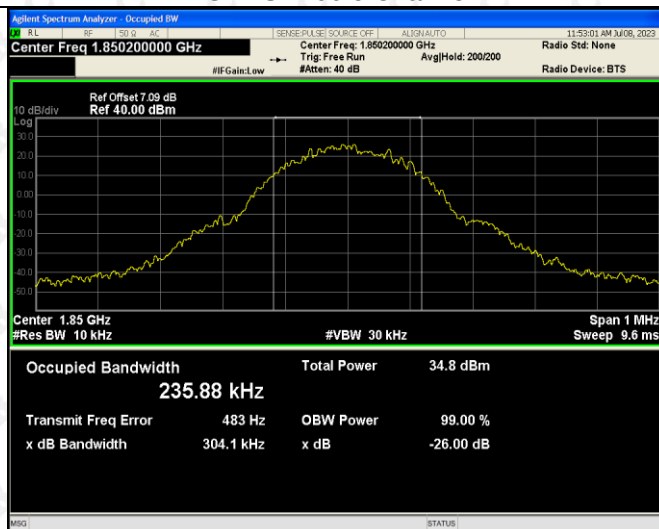


For PCS Band

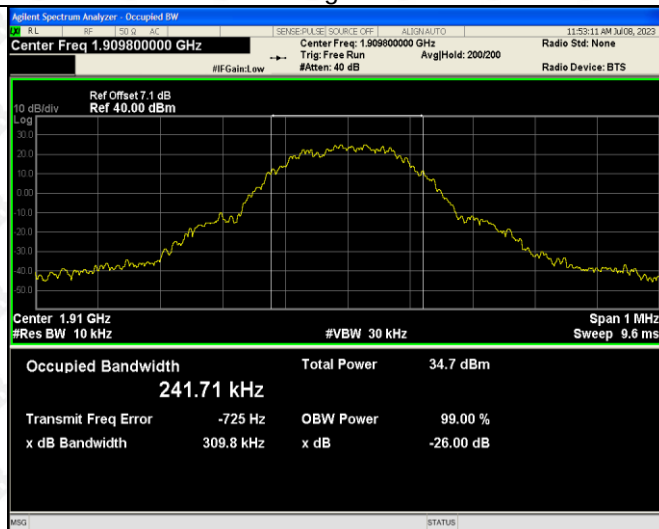
GPRS Low Channel



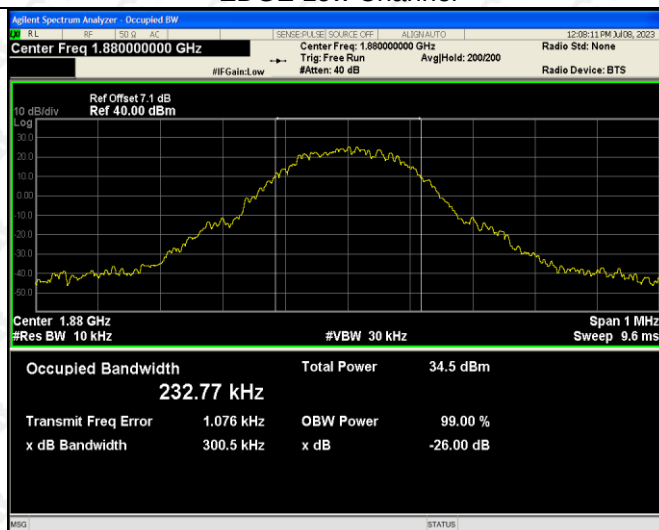
GPRS Middle Channel



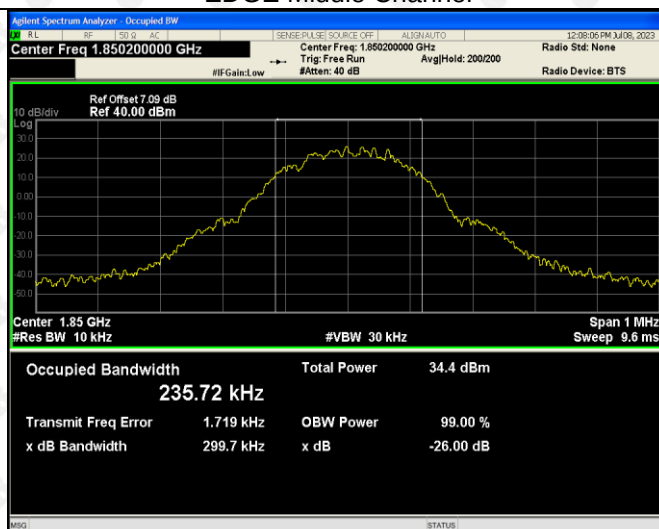
GPRS High Channel



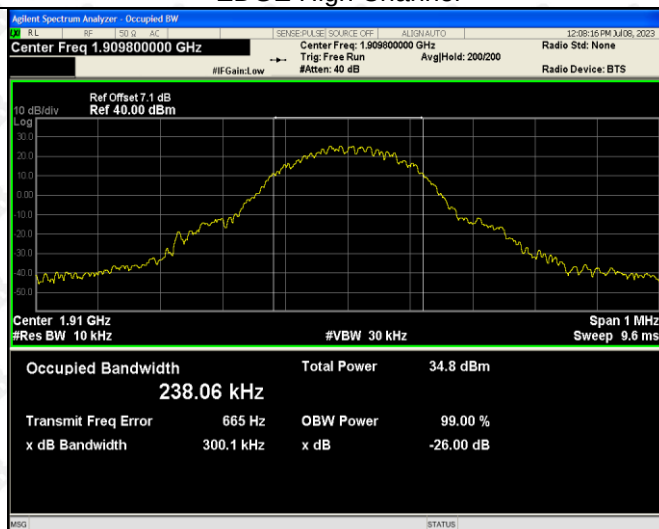
EDGE Low Channel



EDGE Middle Channel



EDGE High Channel



9. OUT OF BAND EMISSIONS AT ANTENNA TERMINAL

9.1 Standard Applicable

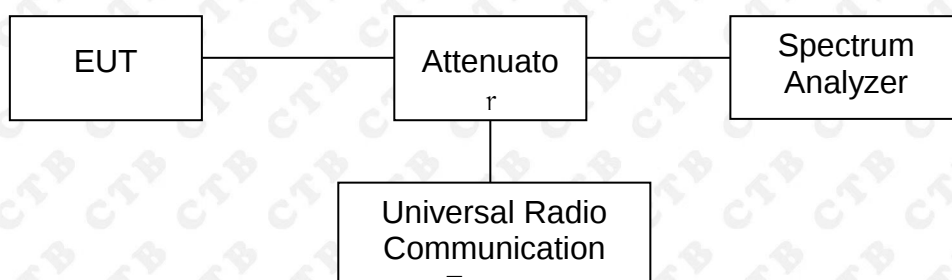
According to §22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

9.2 Test Procedure

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 100kHz and 1MHz for the scan frequency from 30MHz to 1GHz and the scan frequency from 1GHz to up to 10th harmonic.

Test Configuration for the out of band emissions testing:



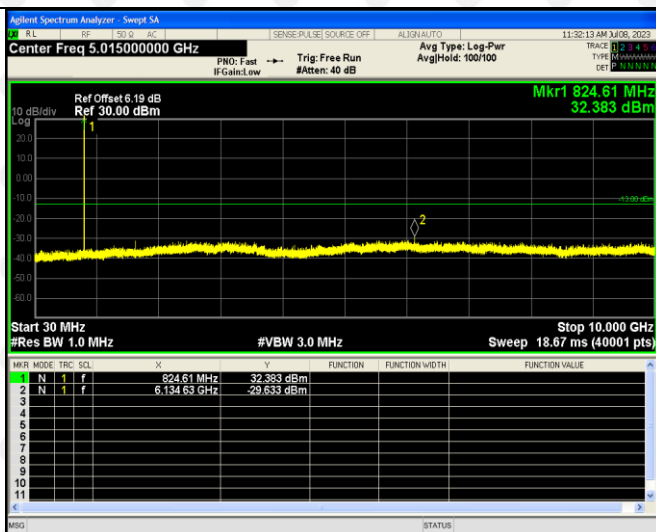
9.3 Environmental Conditions

Temperature:	23 °C
Relative Humidity:	54%
ATM Pressure:	1010 mbar

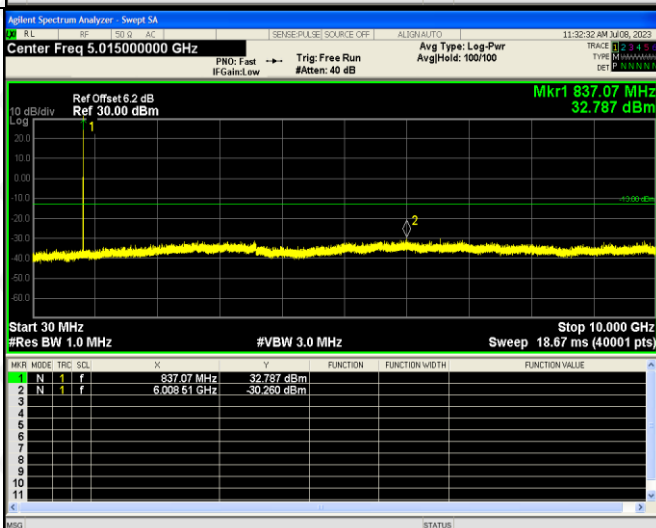
9.4 Summary of Test Results/Plots

Please refer to the following test plots
For Cellular Band

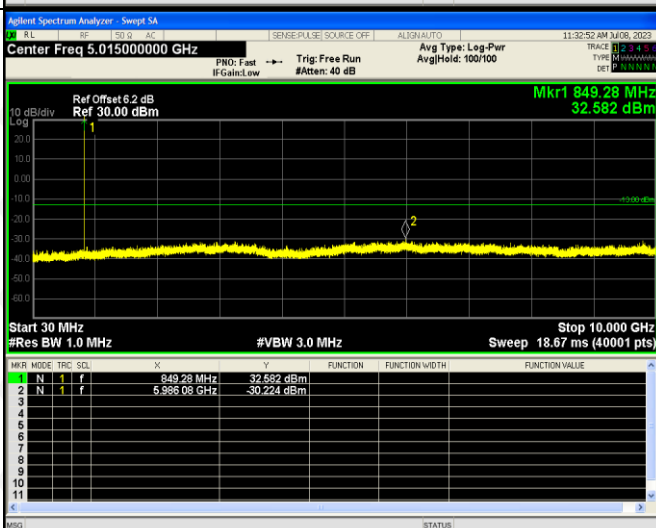
GPRS
Low
Channel



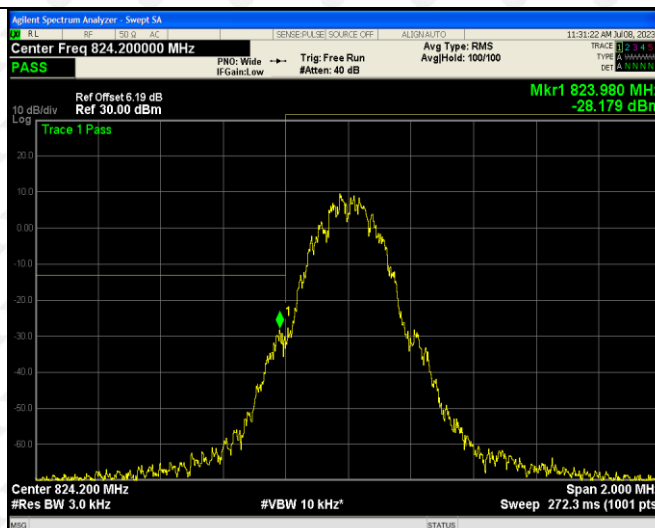
GPRS
Middle
Channel



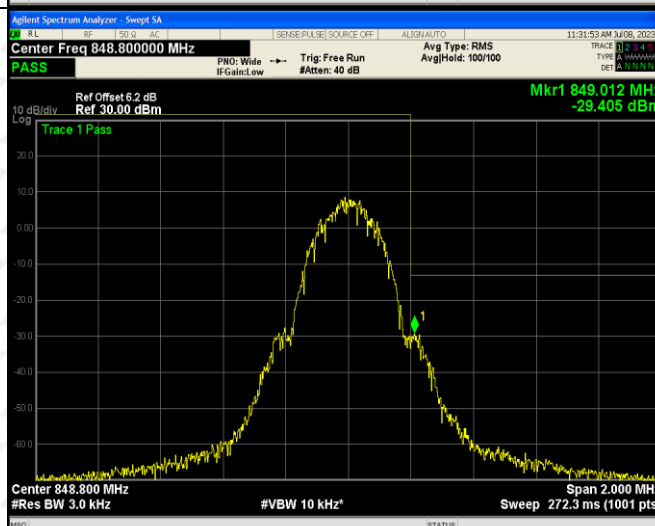
GPRS
High
Channel



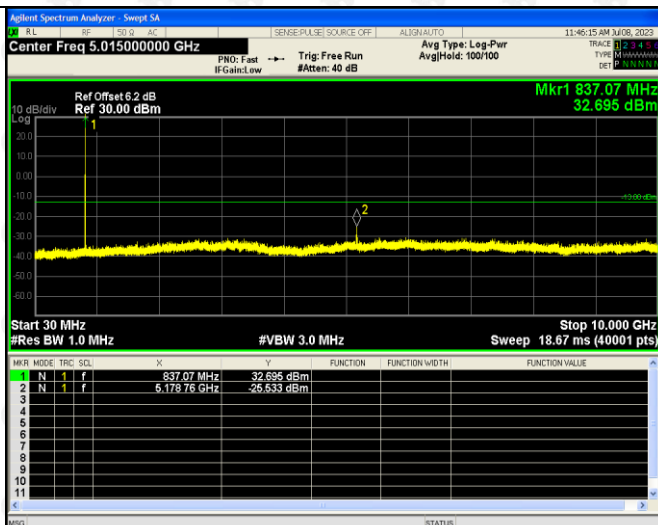
GPRS
Low
Band
Emission



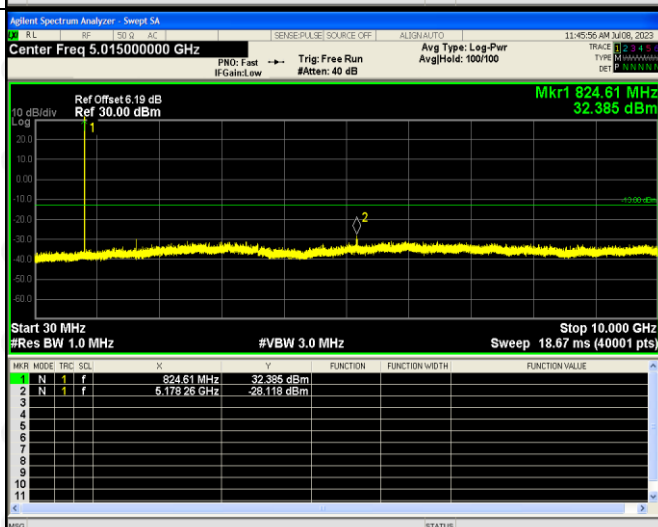
GPRS
High
Band
Emission



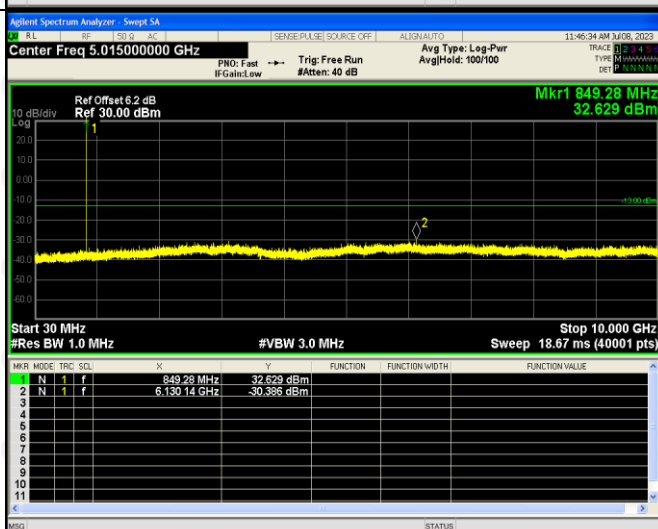
EDGE
Low
Channel



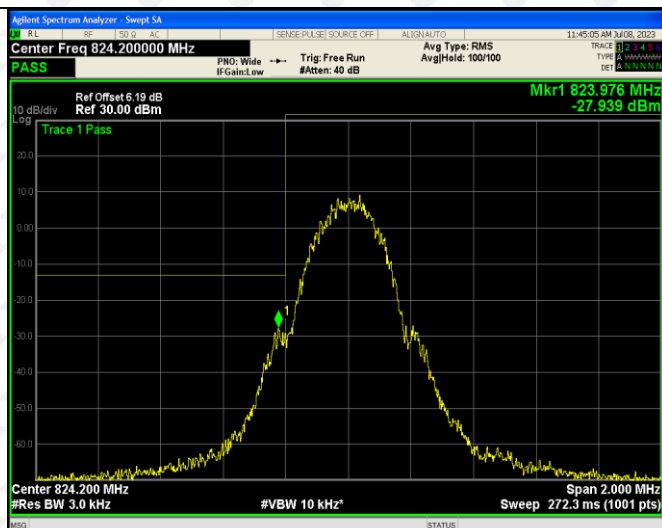
EDGE
Middle
Channel



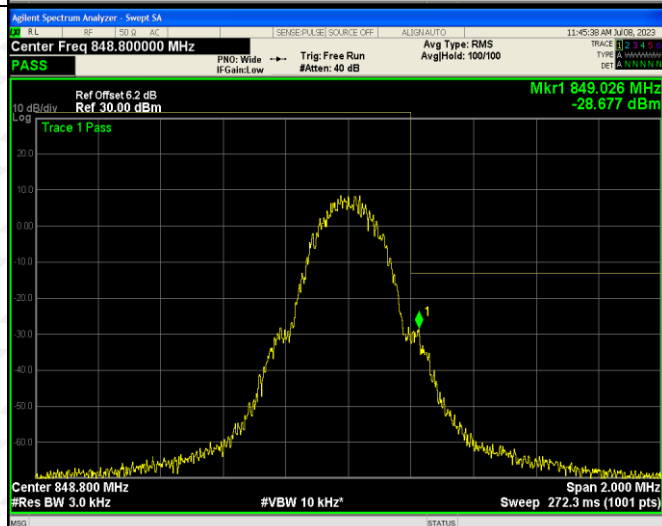
EDGE
High
Channel



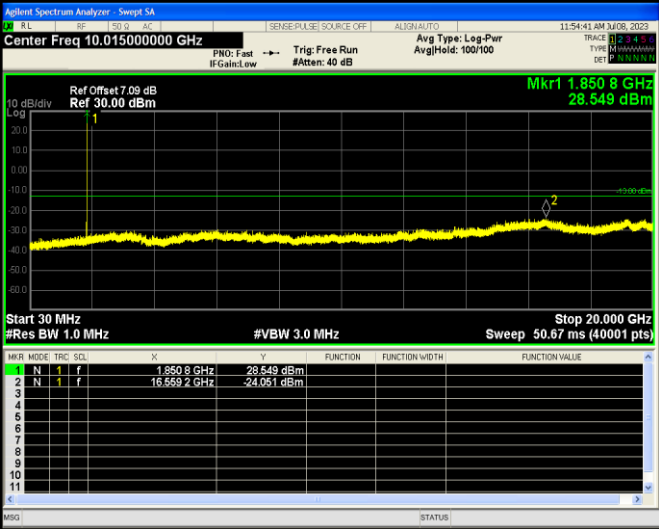
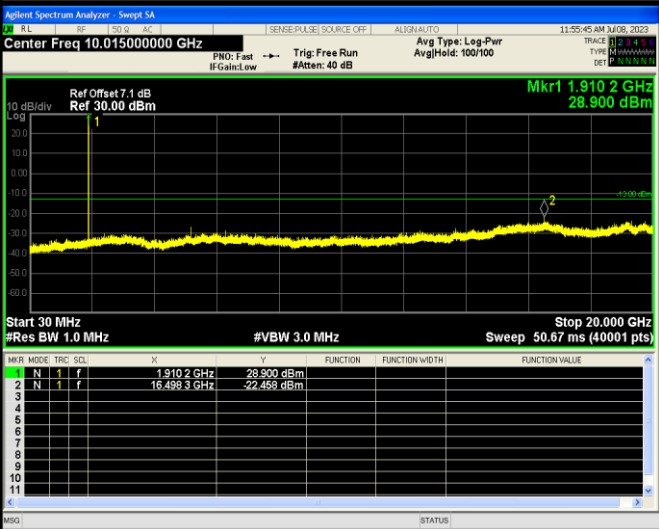
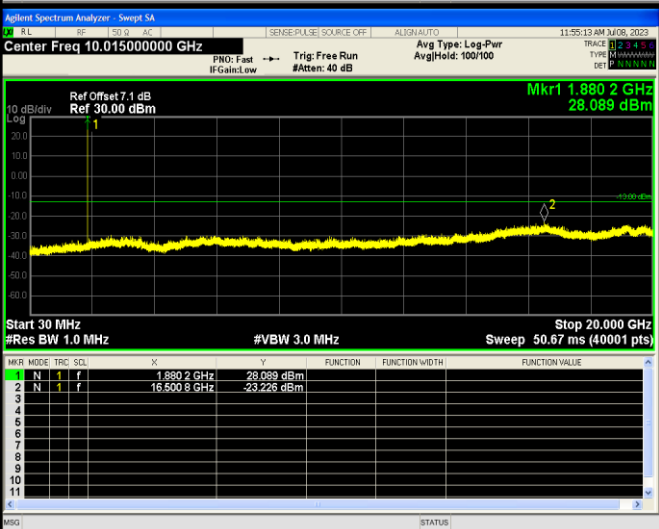
EDGE
Low
Band
Emission



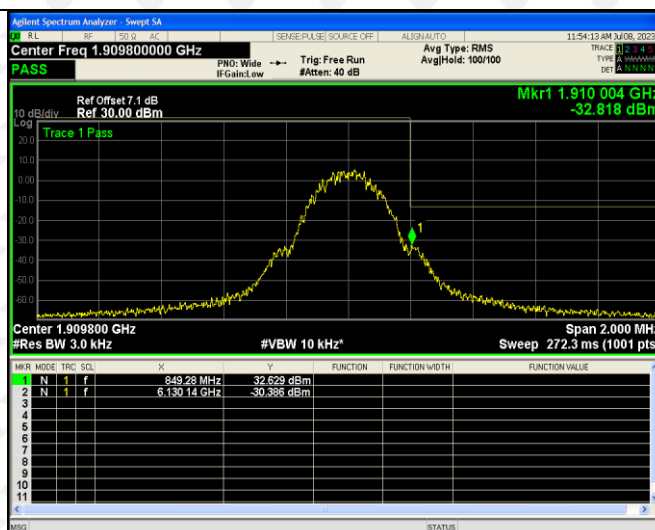
EDGE
High
Band
Emission



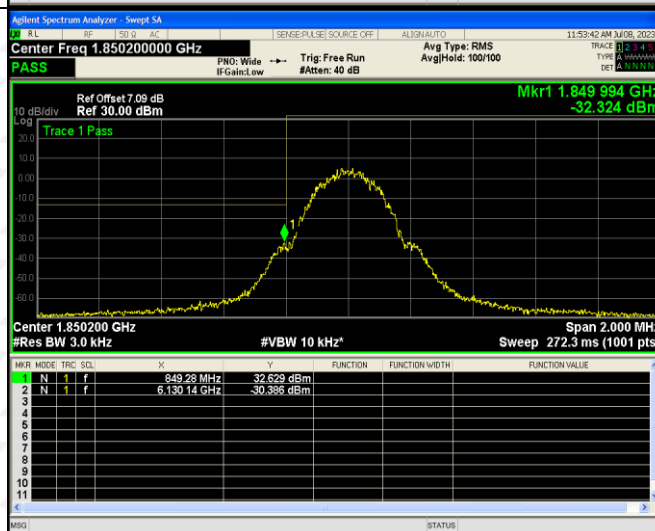
For PCS Band

GPRS Low Channel		
GPRS Middle Channel		
GPRS High Channel		

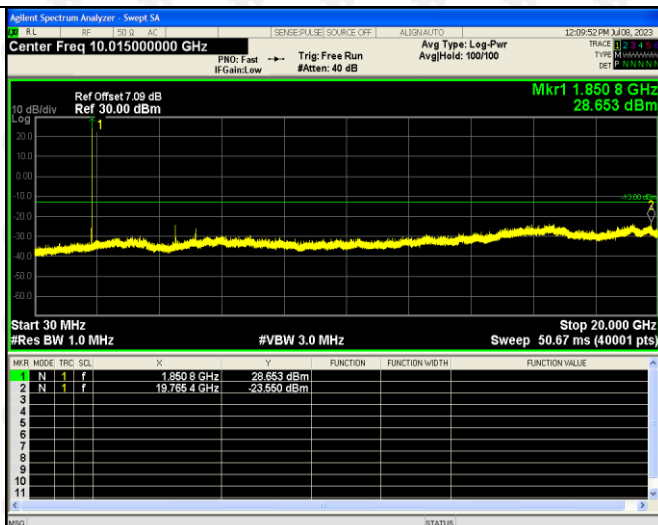
GPRS
Low
Band
Emission



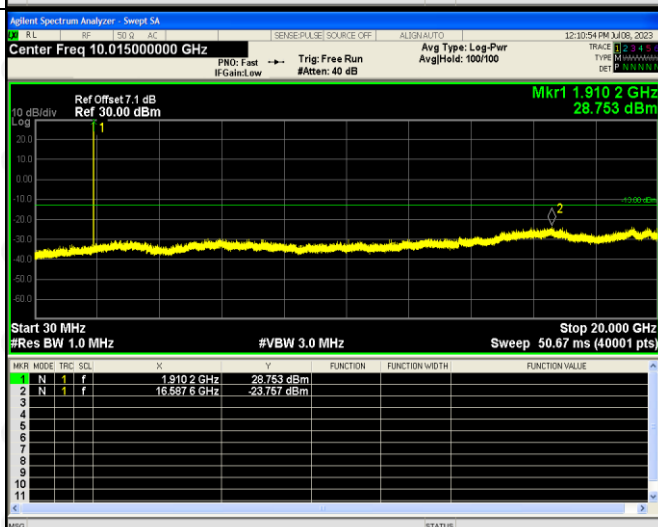
GPRS
High
Band
Emission



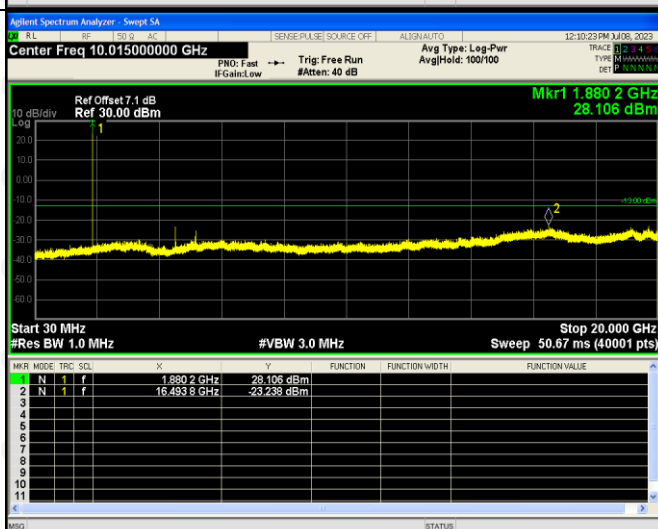
EDGE
Low
Channel



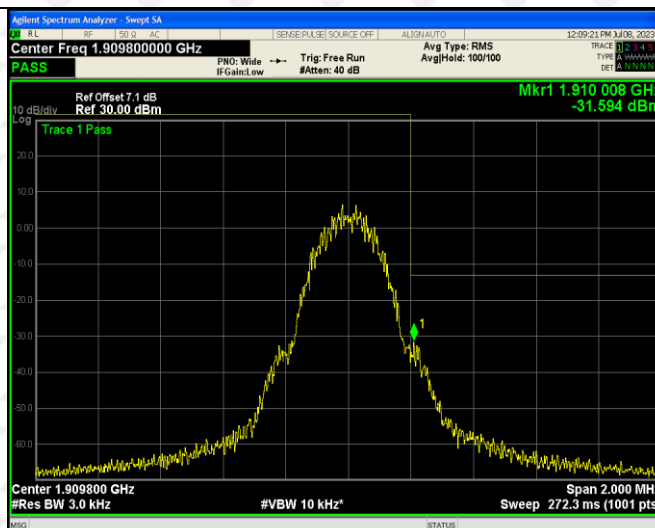
EDGE
Middle
Channel



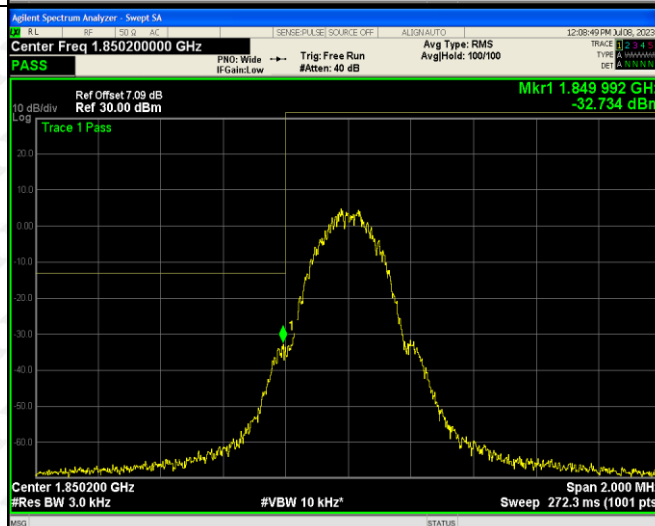
EDGE
High
Channel



EDGE
Low
Band
Emission



EDGE
High
Band
Emission



10. SPURIOUS RADIATED EMISSIONS

10.1 Standard Applicable

According to §22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

10.2 Test Procedure

- 1.The setup of EUT is according with per ANSI/TIA Standard 603D and ANSI C63.4-2014 measurement procedure.
- 2.The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.
- 3.The frequency range up to tenth harmonic of the fundamental frequency was investigated.
- 4.Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious attenuation limit in dB = $43 + 10 \log_{10}(\text{power out in Watts})$

10.3 Environmental Conditions

Temperature:	23 °C
Relative Humidity:	54%
ATM Pressure:	101 kPa
Test Voltage	DC3.8V

10.4 Summary of Test Results/Plots

According to the data below, the FCC Part22.917 and 24.238 standards, and had the worst margin of:

Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

All test modes are performed, but only the worst case is recorded in this report.

For Cellular Band GPRS Mode

Frequency (MHz)	Reading (dBm)	Correct dB	Result (dBm)	Limit (dBm)	Margin (dB)	Polar H/V
Low Channel (824.2MHz)						
43.00	-74.43	4.34	-70.09	-13	-57.09	H
3690.54	-59.21	10.54	-48.67	-13	-35.67	H
5547.50	-55.63	13.37	-42.26	-13	-29.26	H
41.13	-70.12	4.34	-65.78	-13	-52.78	V
3699.60	-56.65	10.54	-46.11	-13	-33.11	V
5544.90	-59.91	13.37	-46.54	-13	-33.54	V
Middle Channel (836.6MHz)						
45.78	-69.64	4.02	-65.62	-13	-52.62	H
3750.91	-54.15	10.71	-43.44	-13	-30.44	H
5637.42	-55.74	13.73	-42.01	-13	-29.01	H
39.80	-64.56	4.14	-60.42	-13	-47.42	V
3759.92	-54.57	10.22	-44.35	-13	-31.35	V
5639.39	-55.43	13.16	-42.27	-13	-29.27	V
High Channel (848.8MHz)						
44.89	-66.79	4.02	-62.77	-13	-49.77	H
3812.18	-63.16	4.9	-58.26	-13	-45.26	H
5727.43	-46.75	8.09	-38.66	-13	-25.66	H
43.26	-54.70	4.25	-50.45	-13	-37.45	V
3819.39	-56.51	4.93	-51.58	-13	-38.58	V
5726.40	-60.47	8.43	-52.04	-13	-39.04	V

For PCS Band GPRS Mode

Frequency (MHz)	Reading (dBm)	Correct dB	Result (dBm)	Limit (dBm)	Margin (dB)	Polar H/V
Low Channel (1850.2MHz)						
46.34	-69.22	4.34	-64.88	-13.00	-51.88	H
3700.4	-53.35	10.54	-42.81	-13.00	-29.81	H
5550.6	-56.25	13.37	-42.88	-13.00	-29.88	H
46.34	-68.54	4.34	-64.20	-13.00	-51.20	V
3700.4	-52.76	10.54	-42.22	-13.00	-29.22	V
5550.6	-56.32	13.37	-42.95	-13.00	-29.95	V
Middle Channel (1880MHz)						
46.34	-69.51	4.02	-65.48	-13.00	-52.48	H
3760.0	-53.49	10.71	-42.78	-13.00	-29.78	H
5640.0	-56.69	13.73	-42.96	-13.00	-29.96	H
46.34	-68.55	4.14	-64.41	-13.00	-51.41	V
3760.0	-53.20	10.22	-42.98	-13.00	-29.98	V
5640.0	-56.41	13.16	-43.25	-13.00	-30.25	V
High Channel (1909.8MHz)						
46.34	-69.67	4.02	-65.65	-13.00	-52.65	H
3819.6	-57.62	4.90	-52.72	-13.00	-39.72	H
5729.4	-44.90	8.09	-36.81	-13.00	-23.81	H
46.34	-58.00	4.25	-53.75	-13.00	-40.75	V
3819.6	-58.74	4.93	-53.81	-13.00	-40.81	V
5729.4	-59.89	8.43	-51.47	-13.00	-38.47	V

Note: Result=Reading+ Correct, Margin= Result- Limit

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, other than listed in the table above are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

11. FREQUENCY STABILITY

11.1 Standard Applicable

According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:

Frequency Tolerance for Cellular Band

Frequency range (MHz)	Base, fixed (ppm)	Mobile >3 watts (ppm)	Mobile ≤3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929	5.0	N/A	N/A
929 to 960	1.5	N/A	N/A
2110 to 2220	10.0	N/A	N/A

According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

According to §27.54 The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

11.2 Test Procedure

According to §2.1055, the following test procedure was performed.

The Frequency Stability is measured directly with a Frequency Domain Analyzer. Frequency Deviation in ppm is calculated from the measured peak to peak value.

The Carrier Frequency Stability over Power Supply Voltage and over Temperature is measured with a Frequency Domain Analyzer in histogram mode

11.3 Environmental Conditions

Temperature:	23°C
Relative Humidity:	54%
ATM Pressure:	101kPa

11.4 Summary of Test Results/Plots

For Cellular Band GPRS Mode

Reference Frequency(Middle Channel): 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	NV	9.04	0.01081
40	NV	9.49	0.01134
30	NV	8.95	0.01070
20	NV	9.17	0.01096
10	NV	10.46	0.01251
0	NV	10.13	0.01210
-10	NV	10.32	0.01234
-20	NV	11.01	0.01317
-30	NV	11.14	0.01332

For PCS Band GPRS Mode

Reference Frequency(Middle Channel): 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	NV	12.13	0.00645
40	NV	12.53	0.00666
30	NV	12.33	0.00656
20	NV	13.09	0.00696
10	NV	12.98	0.00690
0	NV	13.67	0.00727
-10	NV	14.04	0.00747
-20	NV	14.55	0.00774
-30	NV	14.68	0.00781

For Cellular Band EDGE Mode

Reference Frequency(Middle Channel): 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	NV	10.60	0.01267
40	NV	11.66	0.01393
30	NV	11.48	0.01372
20	NV	11.32	0.01354
10	NV	11.32	0.01353
0	NV	12.27	0.01467
-10	NV	11.68	0.01397
-20	NV	12.38	0.01480
-30	NV	12.55	0.01500

For PCS Band EDGE Mode

Reference Frequency(Middle Channel): 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	NV	-10.80	-0.00574
40	NV	-10.17	-0.00541
30	NV	-9.23	-0.00491
20	NV	-9.08	-0.00483
10	NV	-8.65	-0.00460
0	NV	-9.28	-0.00494
-10	NV	-8.16	-0.00434
-20	NV	-8.36	-0.00445
-30	NV	-8.03	-0.00427

So, Frequency Stability Versus Input Voltage is:

Reference Frequency(Middle Channel): GPRS 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	LV	10.97	0.01311
	NV	11.75	0.01404
	HV	11.44	0.01367
Reference Frequency(Middle Channel): GPRS 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	LV	15.07	0.01801
	NV	14.62	0.01748
	HV	14.41	0.01723

Reference Frequency(Middle Channel): EDGE 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	LV	12.53	0.01498
	NV	13.12	0.01569
	HV	13.46	0.01609
Reference Frequency(Middle Channel): EDGE 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	LV	-7.69	-0.00920
	NV	-7.35	-0.00878
	HV	-7.73	-0.00924

12. EUT TEST PHOTO

Radiated Emission

Below 1G



Above 1G



***** END OF REPORT *****